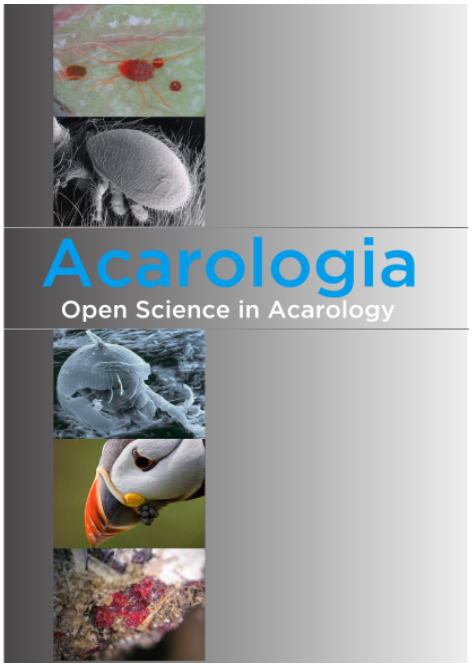

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Previous volumes (2010-2016): 250 € / year (4 issues)
Acarologia, CBGP, CS 30016, 34988 MONTFERRIER-sur-LEZ Cedex, France

The digitalization of Acarologia papers prior to 2000 was supported by Agropolis Fondation under the reference ID 1500-024 through the « Investissements d'avenir » programme (Labex Agro: ANR-10-LABX-0001-01)

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SEVEN NEW PHYTOSEIID SPECIES, WITH A NEW GENERIC ASIGNEMENT AND A KEY TO THE SPECIES OF LA REUNION ISLAND (ACARI: MESOSTIGMATA)

BY S. KREITER [1], E. A. UECKERMANN [2] & S. QUILICI [3]

(Accepted September 2001)

ACARI
PHYTOSEIIDAE
TAXONOMY
LA RÉUNION

SUMMARY: Seven new phytoseiid species: *Kuzinellus bourbonensis*, *Typhlodromus* (*Anthoseius*) *moraesi*, *Phytoseius haroldi*, *Proprioseiopsis longipilus*, *Typhlodromalus nesiotus*, *Typhlodromalus quilicii*, and *Typhlodromips etiennei* are described from La Réunion Island from various crops and surrounding spontaneous vegetation. A species previously recorded in La Réunion as *Kampimodromus spinosus* is assigned to the genus *Amblyseiella*. A key to 30 phytoseiid species encountered in La Réunion is also given.

ACARI
PHYTOSEIIDAE
TAXONOMIE
LA RÉUNION

RÉSUMÉ : Sept nouvelles espèces de la famille des Phytoseiidae : *Kuzinellus bourbonensis*, *Typhlodromus* (*Anthoseius*) *moraesi*, *Phytoseius haroldi*, *Proprioseiopsis longipilus*, *Typhlodromalus nesiotus*, *Typhlodromalus quilicii* et *Typhlodromips etiennei*, sont décrites de l'Ile de La Réunion, collectées dans différentes cultures et dans la végétation spontanée environnante. Une espèce déjà collectée précédemment à La Réunion et identifiée comme *Kampimodromus spinosus* est reclassée dans le genre *Amblyseiella*. Une clé de détermination des 30 espèces rencontrées à la Réunion est également fournie.

Phytoseiulus persimilis Athias-Henriot and *Euseius ovaloides* (Blommers) have been found associated with tetranychids on La Réunion island, as early as 1971 and 1980, respectively (GUTIERREZ & ETIENNE, 1986). UECKERMANN & LOOTS (1985) described *Phytoscutus reunionensis* Ueckermann and Loots from peach and QUILICI *et al.* (1988) found two *Amblyseius* spp., apparently *A. herbicolus* (Chant) and *A. largoensis* (Muma), on litchi. QUILICI *et al.* (1997) reported five species and QUILICI *et al.* (2000) 13 species, from various plants and crops on the island. Thus, to date, the phytoseiid fauna of La Réunion consists of 23 species. Seven additional species are reported in this paper. Of the species reported so far on the island, *P. persimilis* and *A. largoensis* are considered effective predators of

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tetranychids and tenuipalpids in crops (TANIGOSHI, 1982; MCMURTRY, 1982).

MATERIAL AND METHOD

Predatory mites were collected from various cultivated or uncultivated biotopes at different seasons between 1996 and 1998, by beating on the foliage of host-plants over a black plastic plate (diameter: 50 cm) set on a wooden handle (GROUT, personal communication). Mites were then gently transferred with a fine hairbrush (no. 0 or 00) into small vials containing 70 % alcohol. For the majority of samples, except those collected on vegetable crops, a standard methodology was used, namely five beatings per plant for a given locality and date. Mites were cleared with lactic acid, mounted on slides using HOYER's medium and then identified using a phase contrast microscope.

The setal nomenclature used in this paper follows ROWELL *et al.* (1978) and CHANT & HANSELL (1971) for the dorsal and ventral surfaces, respectively. The generic classification system of CHANT & MCMURTRY (1994) is followed for the Typhlodrominae and Phytoseiinae and the system used by MORAES *et al.* (1986) for the Amblyseiinae.

Average measurements for different characteristics followed by their respective ranges (in parentheses) are given in micrometers.

If not otherwise specified, the specimens were collected by S. QUILICI. Specimens of a given phytoseiid species collected on a given plant were attributed generally a reference number as indicated in the text.

The following abbreviations are used in this paper: INRA (Institut National de la Recherche Agronomique; Centre de recherche de Montpellier, France), ENSA.M (Ecole Nationale Supérieure Agronomique de Montpellier, France), MNHN [Muséum National d'Histoire Naturelle (Arthropodes) à Paris, France], PPRI (Agricultural Research Council, Plant Protection Research Institute, Pretoria, Republic of South Africa), CIRAD-FLHOR (Centre International de Recherche Agronomique pour le Développement, Département des productions fruitières et horticoles, La Réunion, France).

TYPHLODROMINAE

Kuzinellus bourbonensis Kreiter and Ueckermann, n.sp.

(Figs. 1-6)

FEMALE (2 specimens)

Dorsum (Fig. 1)— Dorsal shield strongly sclerotized and reticulated, 318 (310-326) long and 161 (160-163) wide, with five pairs of gland pores (solenostomes) and 8 pairs of poroids. Nineteen pairs of dorsal setae and 2 sub-lateral setae: j1 16, j3 10, j4 10, j5 10, j6 11, J2 14, J5 12 (11-13), z2 12 (11-13), z3 16, z4 16, z5 11, z6 13, Z4 21, Z5 45 (43-47), s4 20 (19-21), s6 21, S2 21, S4 26 (24-27), S5 24, r3 21, R1 19. Setae Z5 slightly barbed distally. Setae S4, S5 and Z5 knobbed; other setae smooth.

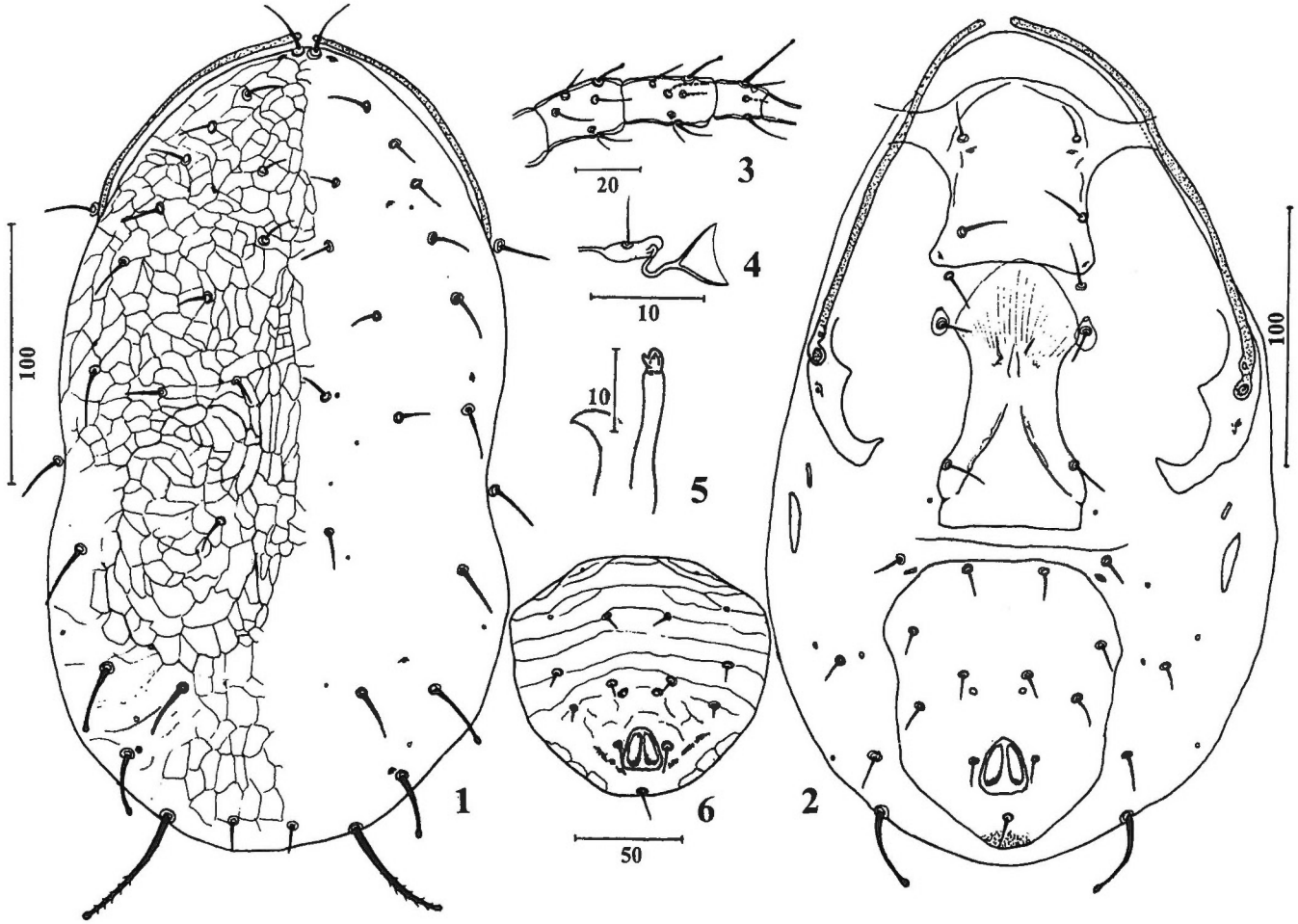
Peritreme (Fig. 1) — Reaching anterior to j1.

Venter (Fig. 2) — All shields smooth. Sternal shield slightly longer than wide, with 2 pairs of setae and 2 pair of pores; third pair of sternal setae on membrane and fourth pair of setae and third pair of pores on small elongate metasternal shields; posterior margin straight. Distances between ST1-ST3 61 (60-63), ST2-ST2 48, ST5-ST5 50 (48-52). Anterior metapodal shield short and slender (5 long), posterior one elongate-oval (21 long and 5 wide). Ventrianal shield pentagonal, with four pairs of pre-anal setae and one pair of large central pre-anal pores. Membrane surroundings ventrianal shield with 4 pairs of setae and 4 pairs of platelets; ventrianal shield 110 (105-116) long, 92 (87-97) wide at level of anterior corners and 78 (72-84) wide at level of anus. JV5 knobbed and 35 (34-37) long.

Legs (Fig. 3) — With knobbed macrosetae on leg IV: SgeIV 15 (15-16), StiIV 16, StIV 28 (27-29); other legs without macrosetae; chaetotaxy of genu III 1 — 2/1, 2/0 — 2 and of genu IV 1 — 2/0, 2/1 — 2.

Chelicera — Its position renders an examination of the teeth impossible. Fixed digit 21 and movable digit 23 (23-24).

Spermatheca (Fig. 4) —Cervix caliciform in the proximal portion and stalked, with the distal portion inflated at the level of atrium, 4 long and wider diameter 4.



FIGS 1-6: *Kuzinellus bourbonensis*, n.sp. 1. — dorsum of the female — 2. — venter of the female — 3. — macrosetae on Leg IV. 4. — spermatheca. 5. — spermatodactyl. 6. — ventrianal shield of the male.

MALE (1 specimen)

Dorsum — Dorsal shield 258 long and 130 wide. Setae j1 16, j3 13, j4 8, j5 8, j6 8, J2 11, J5 11, z2 13, z3 11, z4 13, z5 10, z6 11, Z4 18, Z5 31, s4 13, s6 14, S2 16, S4 18, S5 18, r3 16, R1 13.

Peritreme — Reaching anterior to j1.

Legs — Macrosetae only on leg IV, all knobbed: Sge IV 13, Sti IV 14, St IV 23.

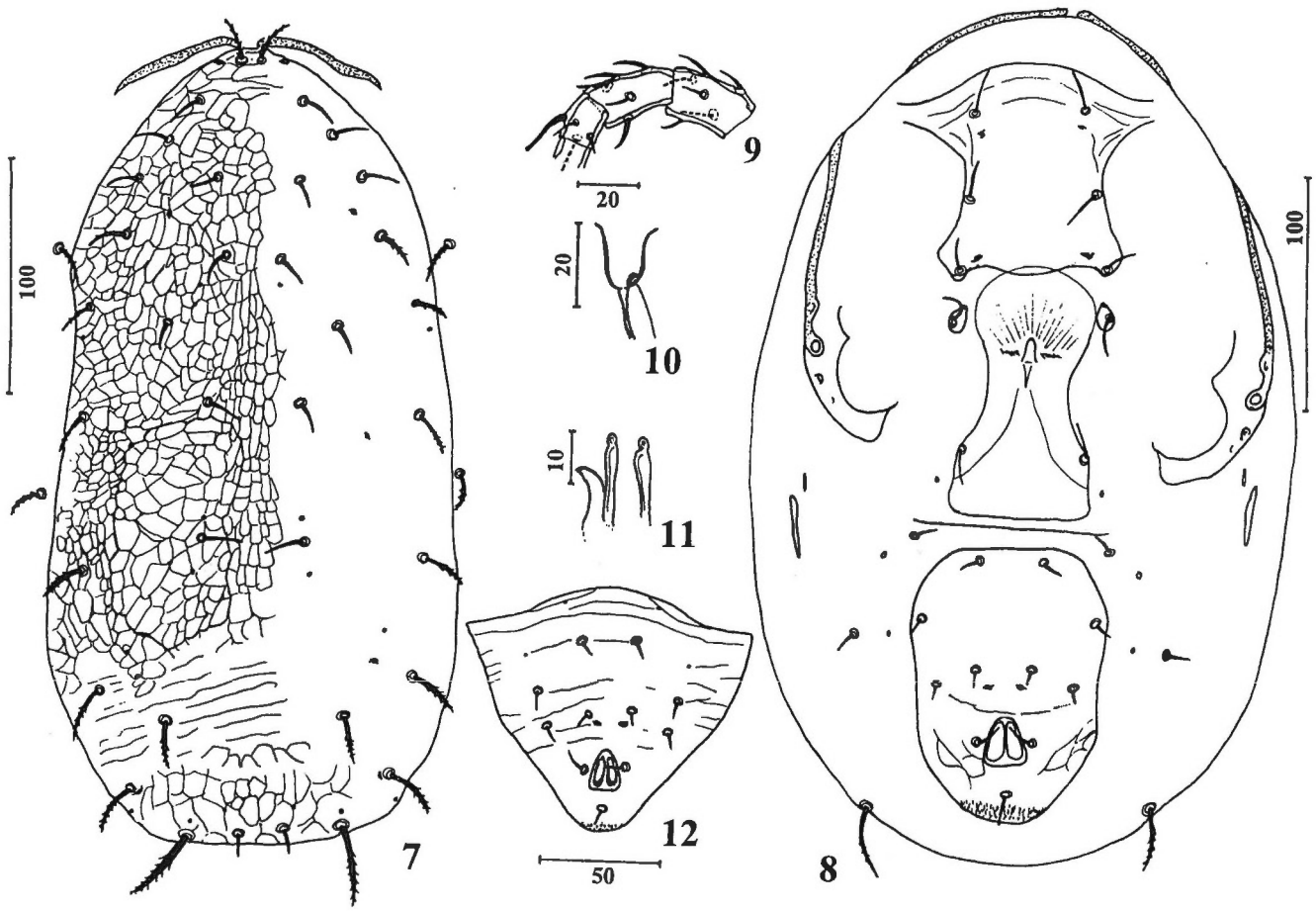
Chelicera (Fig. 5) — Spermatodactyl straight, shaft 18 long.

Venter (Fig. 6) — Distances between ST1-ST5 101, ST2-ST2 45, ST5-ST5 47. Ventrianal shield with four pairs of pre-anal setae and one pair of large pre-anal pores, 101 long, 116 wide at anterior corners and 81 at level of anus, not fused with peritrematal shields.

LOCALITY AND TYPE MATERIAL: Holotype female, one paratype female and one paratype male, Petite France, 16-IV-1997, on *Cryptomeria japonica* (L.f.) D. Don (RQ 3207).

The holotype female and the paratype male are deposited in the ENSA.M-INRA Acarologie collection. One paratype female in the Arachnida collection of ARC-PPRI.

DIAGNOSIS: This new species resembles *K. scytinus* (Chazeau) (CHAZEAU, 1970; CHANT & YOSHIDA-SHAUL, 1986), but differs from the latter in that most of the setae are shorter, except for j1, s4, S5, r3 and R1 which are either equal or longer. It further differs from *K. scytinus* by having Z4 not serrated, S4 and S5



FIGS 7-12: — *Typhlodromus (Anthoseius) moraesi,* n.sp. 7. — dorsum of the female. 8. — venter of the female. 9. — macrosetae on Leg IV. 10. — spermatheca. 11. — spermatodactyl. 12. — ventrianal shield of the male.

knobbed, dorsal shield with only five pairs of gland pores (instead of seven), third pair of sternal setae on the membrane and spermatheca of different shape.

ETYMOLOGY: This species is named in honor of the island Ile de Bourbon, the first name of La Réunion island.

Typhlodromus (Anthoseius) moraesi
Kreiter and Ueckermann, n.sp.
(Figs.7-12)

FEMALE (8 specimens). Dorsum (Fig. 7)— Dorsal shield sclerotized and strongly reticulated, 338 (316-375) long and 168 (156-173) wide, with five pairs of gland pores and 8 pairs of poroids. Seventeen pairs of dorsal setae and two sub-lateral setae: j1 19 (18-21), j3 16 (14-21), j4 11 (10-13), j5 11 (10-11), j6 12 (11-13), J2 14 (13-14), J5 11 (10-11), z2 14 (13-16), z3 15 (14-16), z4 15 (14-16), z5 11 (10-13), Z4 19 (18-21), Z5 31 (26-34), s4 17 (14-19), s6 18 (16-19), S2 19 (18-19), S4 22 (19-24), S5 24 (23-26), r3 16 (16-18), R1 17 (16-18). Setae j1, s4, s6, S2, S4, S5, Z4, Z5, r3 and R1 barbed; other setae smooth.

Peritreme (Fig. 7) — Reaching anterior to j1.

Venter (Fig. 8)— All shields smooth. Sternal shield longer than wide, with 3 pairs of setae and 2 pairs of pores; posterior margin slightly convex; distances between ST1-ST3 64 (63-66), ST2-ST2 52 (50-56), ST5-ST5 52 (48-55). One pair of small metasternal shields, with one pair of setae and one pair of pores. Anterior metapodal plates short and slender (6 long); posterior metapodal plate elongate and slender (22 long). Ventrianal shield pentagonal with 4 pairs of

pre-anal setae and one pair of small pre-anal pores, and a very slight reticulation on both sides of anus; 113 (101-121) long, 86 (82-92) wide at level of anterior corners and 79 (72-82) at level of anus. Membrane surrounding ventrianal shield with 3 pairs of setae and 2 pairs of platelets; JV5 slightly serrated and 29 (27-32) long.

Legs (Fig. 9)— Macrosetae only on leg IV: SgeIV 12 (10-13), StiIV 13, StIV 22 (19-23); macrosetae on tarsus IV knobbed; chaetotaxy of genu III 2/0, 1/1 and of genu IV 0-2/2, 1/0 — 1.

Chelicera — Its position renders an examination of the teeth impossible. Fixed digit 25 (23-27) and movable digit 27 (26-29).

Spermatheca (Fig. 10) — Cervix caliciform, length 16 (13-18) and wider diameter 8. Atrium C-shaped.

MALE (1 specimen). Dorsum — Dorsal shield, 248 long and 143 wide. Setae j1 16, j3 13, j4 10, j5 8, j6 10, J2 11, J5 8, z2 8, z3 11, z4 13, z5 10, Z4 16, Z5 42, s4 23, S2 29, S4 31, S5 37, r3 26, R1 26.

Peritreme — Reaching anterior to j1.

Chelicera (Fig. 11) — Spermatodactyl straight, shaft 21 long.

Venter (Fig. 12) — Distances between ST1-ST3 105, ST2-ST2 43, ST5-ST5 42. Ventrianal shield slightly reticulated, with four pairs of pre-anal setae and one pair of small pre-anal pores, 100 long, 121 wide at anterior corners and 56 at anus level, not fused with peritremal shields.

Legs — Macrosetae only on leg IV: Sge IV 10, Sti IV 10, St IV 16, the latter knobbed.

LOCALITY AND TYPE MATERIAL: Holotype female, one paratype male and four paratype females, Grande Chaloupe, 24-IV-1997, on *Sida* sp. (RQ 3638); one paratype female, Sainte-Marie, 24-IV-1997; on *Schinus terebenthifolius* Raddi (RQ 3636); one paratype female, Sainte-Marie, 24-IV-1997, on *Panicum maximum* L. (RQ 3646); one paratype female, Grande Chaloupe, 24-IV-1997, on *Jatropha curcas* L. (RQ 3650).

Holotype female and the paratype male collected from *Sida* sp. (RQ 3638) and four female paratypes collected on the same plant are deposited in ENSA.M-INRA Acarologie; two female paratypes collected from *S. terebenthifolius* (RQ 3636) and from *P. maximum* (RQ 3646), in ARC-PPRI; one female paratype collected from *J. curcas* (RQ 3650), in MNHN.

DIAGNOSIS: This new species resembles *T. michaeli* (UECKERMANN & LOOTS, 1988), from which it differs by having dorsal setae and leg macrosetae relatively shorter (except macroseta on genu IV), some dorsal setae smooth, third pair of sternal setae on the sternal shield and different shape of spermatheca and spermatodactyl.

ETYMOLOGY: This species is named in honor of the Brazilian acarologist Gilberto José de Moraes, University of São Paulo, Escola Superior de Agricultura Luiz de Queiroz, Piracicaba, Brazil, for his help with the confirmation of the authenticity of most of the new species, the improvement of an early version of this paper, and contribution to the knowledge of the family Phytoseiidae.

PHYTOSEIINAE

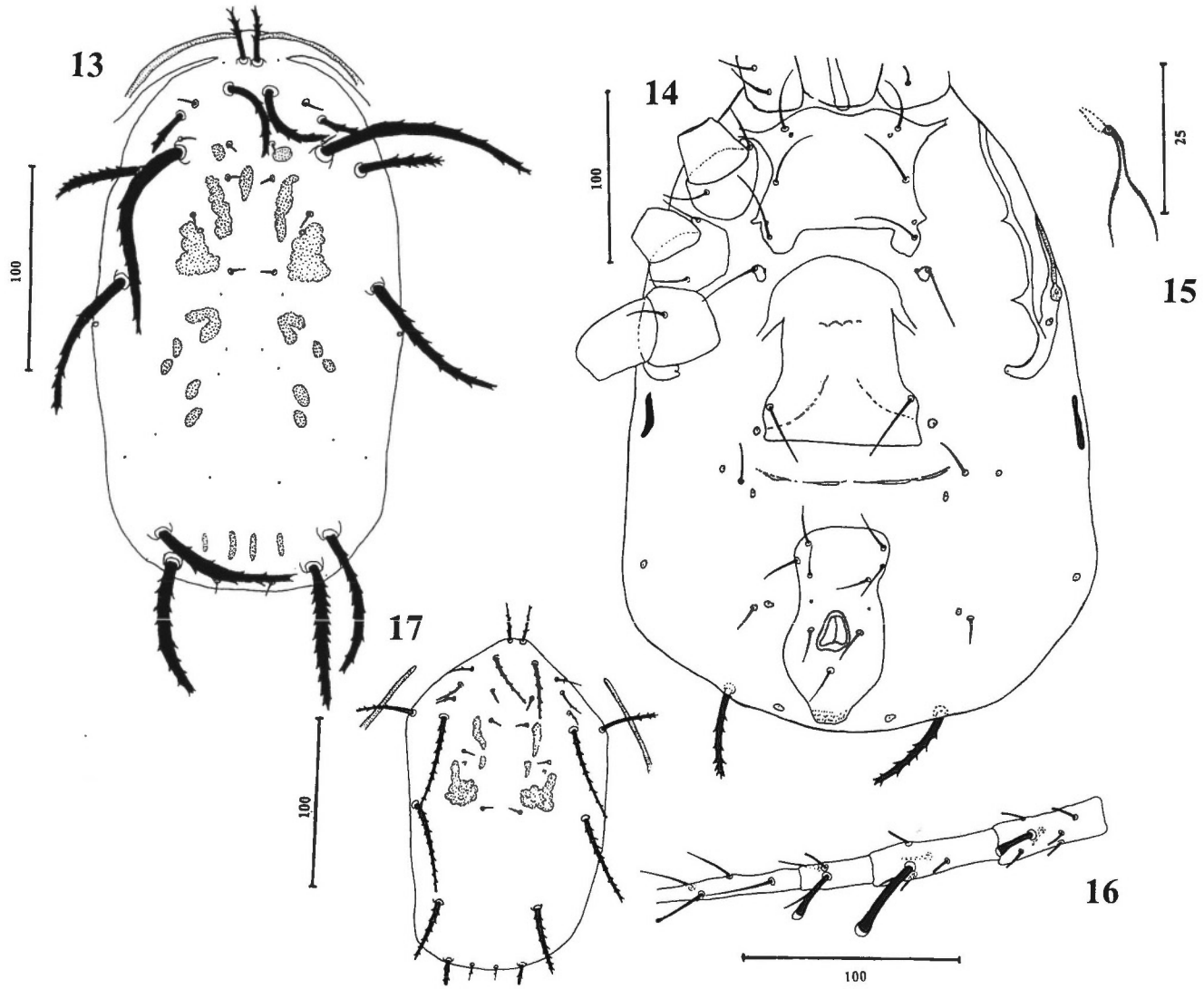
Phytoseius haroldi Ueckermann and Kreiter, n.sp.

(Figs. 13-17)

FEMALE (5 specimens). Dorsum (Fig. 13) — Dorsal shield smooth, 280 (277-284) long and 149 (145-151) wide. Fourteen pairs of dorsal setae and one pair of sub-lateral setae: j1 31 (28-32), j3 44 (44), j4 7 (6-9), j5 7 (6-9), j6 6 (6-7), J5 6 (6), z2 9 (9), z3 24 (22-25), z4 6 (6), z5 6 (6), Z4 77 (72-82), Z5 78 (72-85), s4 113 (107-120), s6 83 (82-85), r3 43 (41-44). Setae j1, j3 z3, s4, s6 Z4, Z5 and r3 long, stout and serrated. Two pairs of large glandular pores, one posterior and slightly mesad to setae z5 and posterolaterad to s6, and 8 other tiny poroids on dorsal shield.

Peritreme (Fig. 13) — Reaching anterior to setae j1.

Venter (Fig. 14) — All ventral shields smooth. Distances between ST1-ST3 56 (54-59), ST2-ST2 64 (54-65), ST5-ST5 66 (63-68). Metasternal setae, ST4, on platelets. A single pair of elongated metapodal shields present. Ventrianal shield vase-shaped, with 3 pairs of pre-anal setae and 2 small pre-anal pores; 94 (88-98) long, 51 (50-54) wide at ZV2 level and 54 (50-57) at anus level. Membrane surrounding ventrianal shield with 3 pairs of setae and 5 pairs of small platelets. JV5 47 (54) long, stout and serrated.



FIGS 13-17: — *Phytoseius haroldi*, n.sp. 13. — dorsum of the female. 14. — venter of the female. 15. — spermatheca. 16. — macrosetae on Leg IV. 17. — dorsum of the deutonymph.

Chelicerae — Fixed digit 28 (28) long and movable digit 25 (25) long. Position of digits renders the counting of the teeth impossible.

Spermatheca (Fig. 15) — Proximal half of cervix slender and distal half bell-shaped, 17 (16-19) long; atrium small, bulbous.

Legs (Fig. 16) — Sge IV, Sti IV and St IV stout with large hyaline knobs. Telotarsus also with a slender knobbed macroseta. Lengths of macrosetae: Sge IV 19 (19), Sti IV 45 (43-47), St IV 30 (28-32), telotarsus IV 23 (22-25); chaetotaxy of genu III 1-2/0, 2/0 — 1 and of genu IV 2 — 2/1, 2/0 — 1.

DEUTONYMPH (2 specimens). Dorsum (Fig. 17) — Dorsal shield reduced, 211 long and 123 wide. Setae j1 25, j3 32 (29-35), j4 8 (6-9), j5 8 (6-9), J5 9, z2 18 (16-19), z3 21 (19-23), z4 13 (9-16), z5 8 (6-9), Z4 43 (41-44), Z5 40 (38-41), s4 60, s6 55 (52-57), r3 38 (37-38). Setae z2 and z4 twice as long as in female and serrated opposed to smooth in the female. Setae j1, j3, z3, Z4, Z5, s4, s6 and r3 stout, long and serrated.

Peritreme (Fig. 17) — Reaching level of setae z2.

Venter — Distances between ST1-ST3 61 (59-62), ST2-ST2 52 (50-54), St5-ST5 40 (38-41). Sternal

shield weakly sclerotized, with setae ST1-ST4. Opisthogaster with anal shield and six pairs of setae of which JV5 is the longest (19) and serrated. Metapodal shields absent.

Chelicerae — Movable digit 19 (19) long, with one tooth; fixed digit 19 (19) long, with four teeth.

Legs — All macrosetae knobbed, of the following lengths: Sge IV 16 (13-19), Sti IV 33 (30-35), St IV 32 (30-33), telotarsus 22-23; chaetotaxy of genu III 1 — 2/0, 2/0 — 1 and of genu IV 1 — 2/1, 2/0 — 1.

LOCALITY AND TYPE MATERIAL: Holotype female, one paratype female and one paratype deutonymph, Saint-Philippe, on *Solanum auriculatum* Aiton (RQ 3220), 14-V-1997; two paratype females, Bassin-Plat, on *Curcurbita pepo* (L.) Dumort (RVA 591), 24-I-1998; one paratype deutonymph, Salazie, on *S. auriculatum* (RQ 3208), 30-IV-1997; one paratype female, Ravine des Cabris, on *Euphorbia pulcherrima* Willd. (S. Kreiter), 31-VII-1999.

Holotype female, one paratype female and one paratype deutonymph collected from *S. auriculatum* (RQ 3220), are deposited in ARC-PPRI; two paratype females collected from *C. pepo* (RVA 591) and one paratype deutonymph collected from *S. auriculatum* (RQ 3208), in ENSA.M-INRA Acarologie; one paratype female collected from *E. pulcherrima* (S. Kreiter), in MNHN.

DIAGNOSIS: *Phytoseius haroldi* resembles *P. longus* Wu & Li, *P. hawaiiensis* Prasad, *P. punjabensis* Gupta and *P. rachelae* Swirski & Schechter. However, *P. longus* differs in that setae s4 (90) and s6 (63.5) are much shorter, Z4 is much longer than Z5, St IV is absent and peritremes only reach anterolateral to setae j1. The shape of the spermatheca and setae ST4 situated on integument, distinguish *P. hawaiiensis* from *P. haroldi*. *Phytoseius punjabensis* differs in the shape of the spermatheca and sternal shield, setae s4 (97) and s6 (97) being sub-equal in length and in that setae ST4 are situated on the integument. The bottle-shaped spermatheca, much shorter setae j1, j3, z3, s4, s6 and Sti and St IV and setae j1 and j3 being equally long, differentiate *P. rachelae* from the new species. *Phytoseius haroldi* is also very similar to *P. rex* DeLeon. However, it has longer dorsal setae, pre-anal pores on the ventrianal shield, 4 teeth on the fixed cheliceral digit opposed to 2 in *P. rex* and macroseta St IV shorter (28-32 in *P. haroldi* opposed to 37-40 in *P. rex*).

ETYMOLOGY: This species is named for Dr. Harold Denmark of Gainesville, Florida, USA, for his help with the determination of the authenticity of this species.

AMBLYSEIINAE

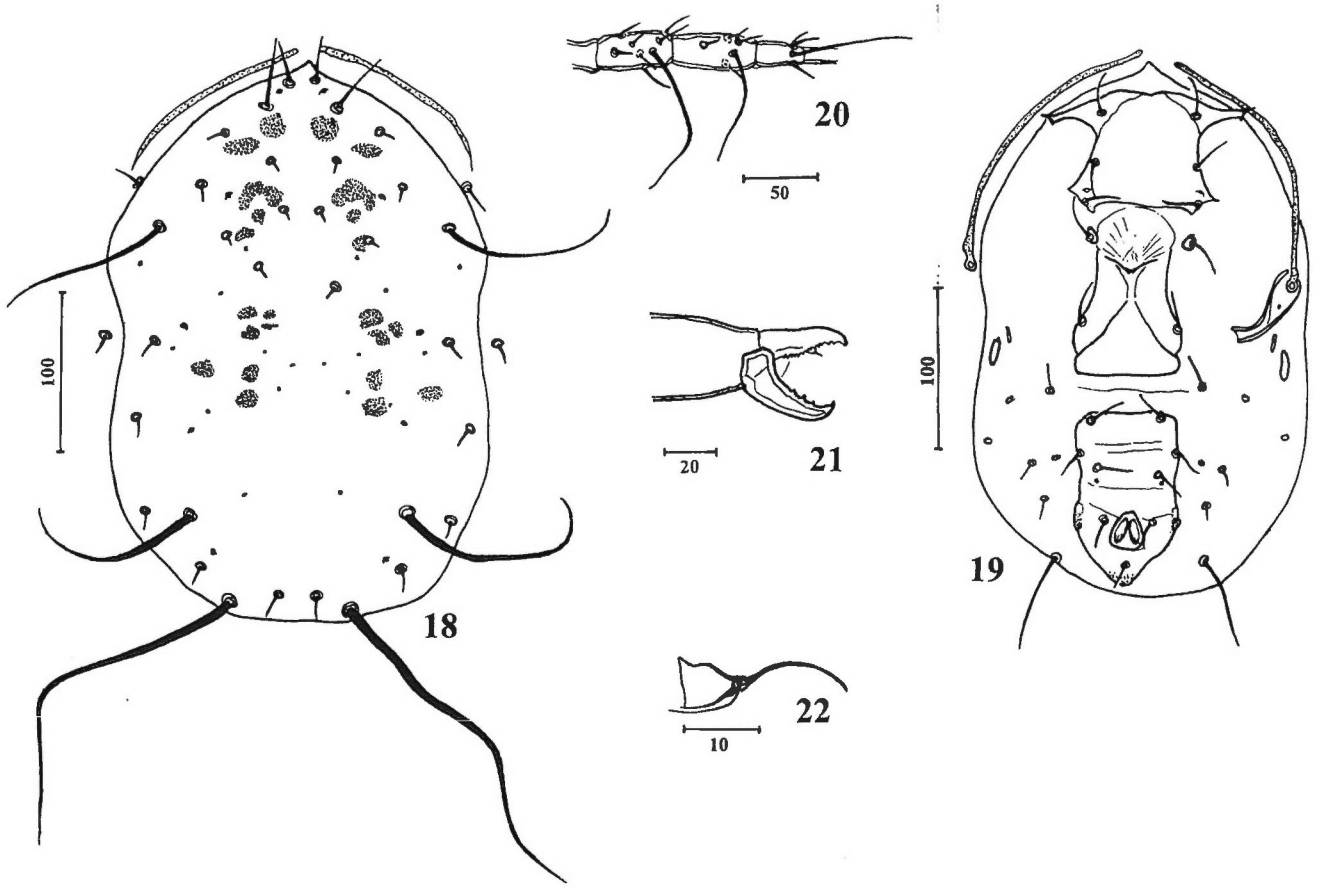
Proprioseiopsis longipilus
Kreiter and Ueckermann, n.sp.
(Figs. 18-22)

FEMALE (14 specimens). Dorsum (Fig. 18)— Brownish red, smooth, not exceptionally sclerotized, 349 (309-411) long and 217 (193-235) wide, with 5 pairs of glandular pores and 9 pairs of small poroids. Sixteen pairs of dorsal setae and two pairs of sub-lateral setae: j1 35 (31-39), j3 46 (43-48), j4 6 (5-10), j5 6 (5-8), j6 9 (6-13), J5 10 (8-11), z2 10 (8-11), z4 12 (10-16), z5 6 (5-8), Z1 11 (10-13), Z4 133 (118-148), Z5 242 (229-253), s4 114 (108-129), S2 and S4 13 (13-16), S5 14 (13-16), r3 21 (16-26), R1 13 (10-16). Setae Z4 and Z5 slightly barbed or occasionally barbs unnoticeable; other setae smooth.

Peritreme (Fig. 18)— Reaching anterior to j1.

Venter (Fig. 19)— All shields smooth. Sternal shield slightly wider than long, with 3 pairs of setae and a pair of pores and posterior margins straight. One pair of metasternal shields with a pair of setae and a pair of pores. Distances between ST1-ST3 65 (61-68), ST2-ST2 75 (69-80), ST5-ST5 69 (64-74). Anterior metapodal shield short and slender (13 long); posterior metapodal shield elongate-oval (21 long and 5 wide). Ventrianal shield elongate with 3 pairs of pre-anal setae and a pair of pre-anal pores. Membrane surrounding ventrianal shield with 4 pairs of setae and 3 pairs of platelets; 116 (108-124) long, 72 (66-77) wide at level of anterior corners and 73 (68-79) at level of anus; JV5 16 (13-18) long.

Legs (Fig. 20)— With long to very long macrosetae on all legs: Sge I 41 (39-42), Sge II 39 (35-42), Sge III 49 (48-53), Sti III 39 (37-45), SgeIV 113 (105-121), StiIV 82 (80-85), StIV 89 (85-93); chaetotaxy of genu III 1 — 2/1, 2/0 — 1 and of genu IV 1 — 2/1, 2/0 — 1.



FIGS 18-22: — *Proprioseiopsis longipilus*, n.sp. 18. — dorsum of the female. 19. — venter of the female. 20. — macrosetae on Leg IV. 21. — chelicera of the female . 22. — spermatheca.

Chelicera (Fig. 21) — Fixed digit 36 (34-39), with 2 subapical teeth, followed by 11 in row; movable digit 37 (35-40), with 3 teeth.

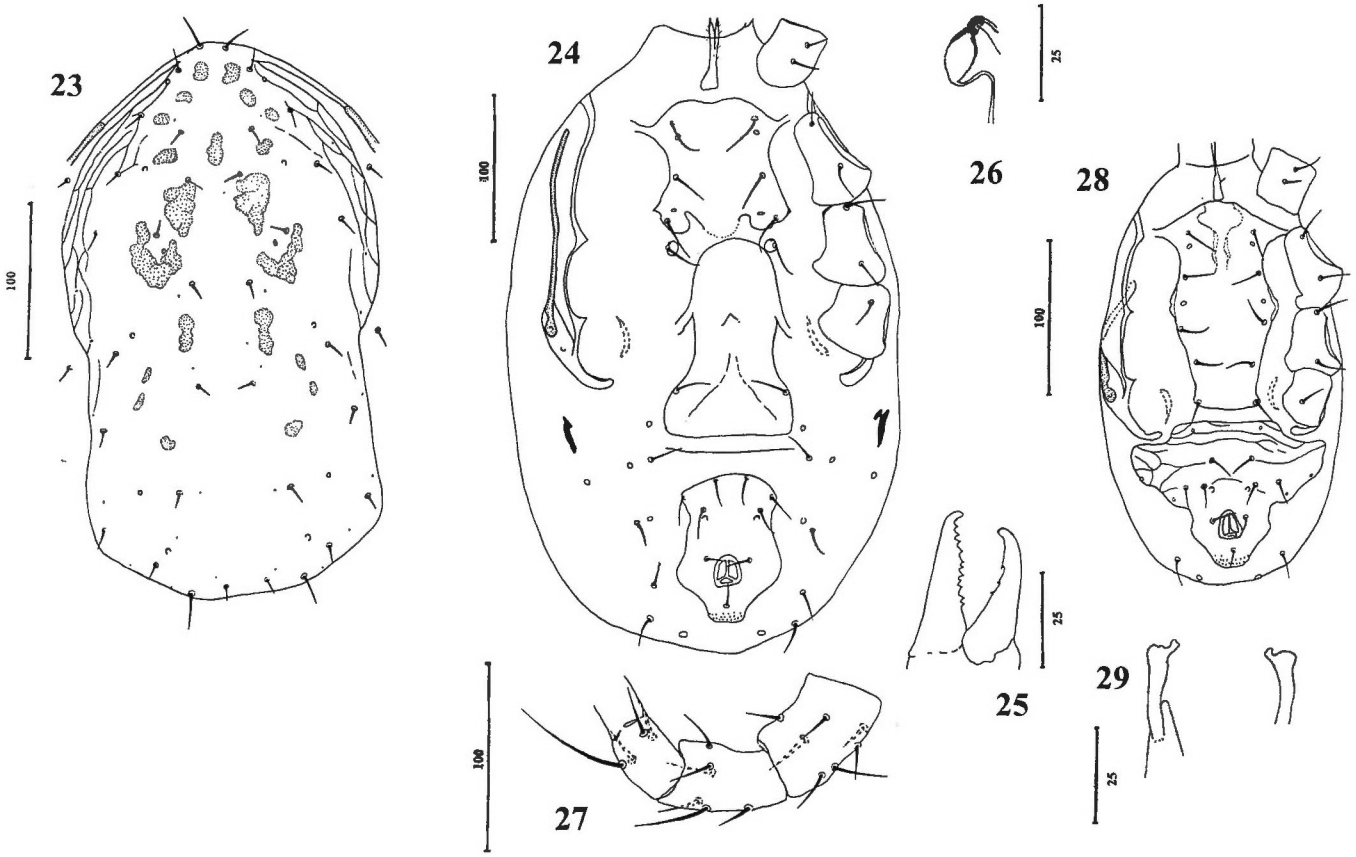
Spermatheca (Fig. 22) — Cervix caliciform, 9 (8-13) long and wider diameter 6 (5-6); Atrium large.

LOCALITY AND TYPE MATERIAL: Holotype female and one paratype female, Petite France, 16-IV-1997, on *Rubus alcaefolius* L. (RQ 3202); 8 paratype females, Petite France, 16-IV-1997, on *Cryptomeria japonica* (L.f.) D. Don (RQ 3203 and 3207); 1 paratype female, Petite France, 16-IV-1997, on *Acacia mearnsii* De Wild (RQ 3631) and three paratype females, Colimaçons, 31-XII-1996, on *Citrus* sp. (RQ 3328).

Holotype female, one paratype female collected from *R. alcaefolius* (RQ 3202) and six paratype females collected from *C. japonica* (RQ 3203 and 3207), are deposited in ENSA.M-INRA Acarologie; two paratype females collected from *C. japonica* (RQ 3203 and 3207), in MNHN; four paratype females collected from *A. mearnsii* (RQ 3631) and from *Citrus* sp. (RQ 3328), in ARC-PPRI.

DIAGNOSIS: *P. longipilus* belongs to the genus *Proprioseiopsis*, in which setae J2 are absent and genu II bears eight setae. *P. longipilus* resembles *P. tulearensis* (BLOMMERS, 1976) but differs in having s4, Z4 and Z5 more than twice longer, macrosetae longer and shape of ventrianal shield and spermatheca different. It is also similar to *P. messor* (Wainstein) from which it differs by the larger number of teeth on fixed chelicera digit and shape of ventrianal shield. From *P. popularis* (DeLeon) and *P. precipitans* (DeLeon) it differs by having setae j3 longer and setae s4, Z4 and Z5 shorter and from *P. terrestris* (Chant) by the shape of ventrianal shield.

ETYMOLOGY: The name of this species refers to the abnormally long setae Z4 and Z5 for a species of the genus *Proprioseiopsis*.



FIGS 23-29. — *Typhlodromalus nesiotus*, n.sp. 23. — dorsum of the female. 24. — venter of the female. 25. — chelicera of the female. 26. — spermatheca. 27. — macrosetae on Leg IV. 28. — venter of the male. 29. — spermatodactyl.

Typhlodromalus nesiotus
Ueckermann and Kreiter, n.sp.
(Figs. 23-29)

FEMALE (2 specimens). Dorsum (Fig. 23) — Dorsal shield with anterolateral striations, 341 (334-347) long and 178 (176-180) wide, with 6 pairs of large glandular pores and 11 pairs of small poroids. Seventeen pairs of dorsal setae and two pairs of sub-lateral setae: j1 21 (19-22), j3 15 (14-16), j4 9 (9), j5 9 (9), j6 9 (9), J2 10 (9-11), J5 7 (6-8), z2 13 (13), z4 13 (13), z5 9 (9), Z1 9 (9), Z4 10 (9-11), Z5 19 (19), s4 13 (13), S2 10 (9-11), S4 9 (9), S5 9 (9), r3 10 (9-11), R1 10 (9-11). Dorsal setae smooth. In one of the two specimens examined one of the members of setae R1 is situated on the dorsal shield.

Peritreme (FIG. 23) — Short, reaching level of z2.

Venter (Fig. 24) — All ventral shields smooth. Distances between ST1-ST3 59 (57-60), ST2-ST2 49 (47-50) and ST5-ST5 61 (59-62). Two pairs of metapodal shield of each side fused. Ventrianal shield 92 (85-98) long, 59 (54-63) wide at level of ZV2, 60 (57-63) at anal level. Membrane surrounding ventrianal shield with 4 pairs of setae and 5 pairs of platelets. JV5 19 long.

Chelicera (Fig. 25) — Fixed digit 32 long, with 10-11 teeth; movable digit 28 long, with 3 teeth.

Spermatheca (Fig. 26) — Proximal third of cervix bulged and thick-walled and rest slender, 32 long. Atrium C-shaped.

Legs (Fig. 27) — Macrosetae acute and measure as follows: Sge IV 19 (19), Sti IV 25 (25), St IV 37 (35-38); Sti not distinct in holotype; chaetotaxy of genu II 2 — 2/0, 2/0 — 1 and of genu III 1 — 2/1, 2/0 — 1.

MALE (1 specimen). Dorsum — Dorsal shield, 239 long and 132 wide, as in female except for setae r3 and

R1 which are on the shield. Setae j1 16, j3 16, j4 9, j5 9, j6 9, J2 9, J5 6, z2 13, z4 13, z5 9, Z1 8, Z4 9, Z5 19, s4 13, S2 9, S4 9, S5 9, r3 9, R1 9.

Peritreme (Fig. 28) — Reaching to level of z4.

Venter (Fig. 28) — Distances between ST1-ST3 50, ST2-ST2 41, ST5-ST5 42. Ventrianal shield 88 long, 120 wide at anterior corners; not fused with peritrematal shields.

Chelicera (Fig. 29) — Spermatodactyl straight with small, slender lateral process distally, shaft 19 long.

Legs — Sge IV 13, Sti IV 16, St IV 28.

LOCALITY AND TYPE MATERIAL: Holotype female, one paratype female and one paratype male, Petite France, on *Hypericum revolutum* Vahl (RQ 3628), 16-IV-1997.
The holotype and the paratype male are deposited in the Arachnida Collection of ARC-PPRI; one paratype female, in ENSA.M-INRA Acarologie.

DIAGNOSIS: This species is closely related to *T. macrosetosus* (Van der Merwe), *T. circellatus* (Wu & Li), *T. dowdi* (Schicha & O'Dowd) and *T. havu* (Pritchard & Baker) in that the peritremes are short, not reaching past setae j3 and in the shape of the spermatheca. However, it differs from all these species in that most of the dorsal setae are much shorter, with j1 and Z5 equal in length or j1 even slightly longer than Z5; in all these species setae j1 are clearly shorter than Z5. *Typhlodromalus havu* and *T. macrosetosus* bear five macrosetae on leg IV of which some can be knobbed or blunt distally, whereas *T. nesiotus* bears only three acute macrosetae on leg IV. *Typhlodromalus nesiotus* differs from *T. dowdi* and *T. circellatus,* in that leg IV bears three macrosetae, opposed to only one in the latter two species. *Typhlodromalus dowdi* further differs in that the teeth on the fixed cheliceral digit are restricted to the anterior half of the digit, opposed to spread along the inner margin of the fixed digit in *T. nesiotus. Typhlodromalus nesiotus* is also related to *T. planetarius* (DeLeon) because of the short peritremes. However, in the latter species the peritremes reach to setae j3, opposed to z2 in *T. nesiotus.* Most of the dorsal setae of *T. planetarius* are also clearly longer than those of *T. nesiotus*. Unfortunately DELEON (1959) has not depicted the spermatheca of *T. planetarius.*

ETYMOLOGY: The name of this species is derived from the Greek word "nesiotes" which means "islander".

Typhlodromalus quilicii
Ueckermann and Kreiter, n.sp.
(Figs. 30-33)

FEMALE (3 specimens). Dorsum (Fig. 30) — Dorsal shield with lateral striations, 365 (340-378) long and 242 (221-256) wide. Seventeen pairs of dorsal setae and two pairs of sub-lateral setae: j1 27 (25-28), j3 14 (13-16), j4 9(9), j5 9 (9), j6 10 (9-11), J2 10 (9-11), J5 6 (6), z2 15 (13-16), z4 14 (13-16), z5 10 (9-11), Z1 10 (9-13), Z4 11 (9-13), Z5 19 (19), s4 16 (13-19), S2 13 (13), S4 13 (13-14), S5 11 (9-13), r3 13 (13), R1 12 (11-13). All dorsal setae smooth. Dorsal shield also bears 6 pairs of large glandular pores and 8 pairs of small poroids.

Peritreme (Fig. 30) — Almost reaching j1.

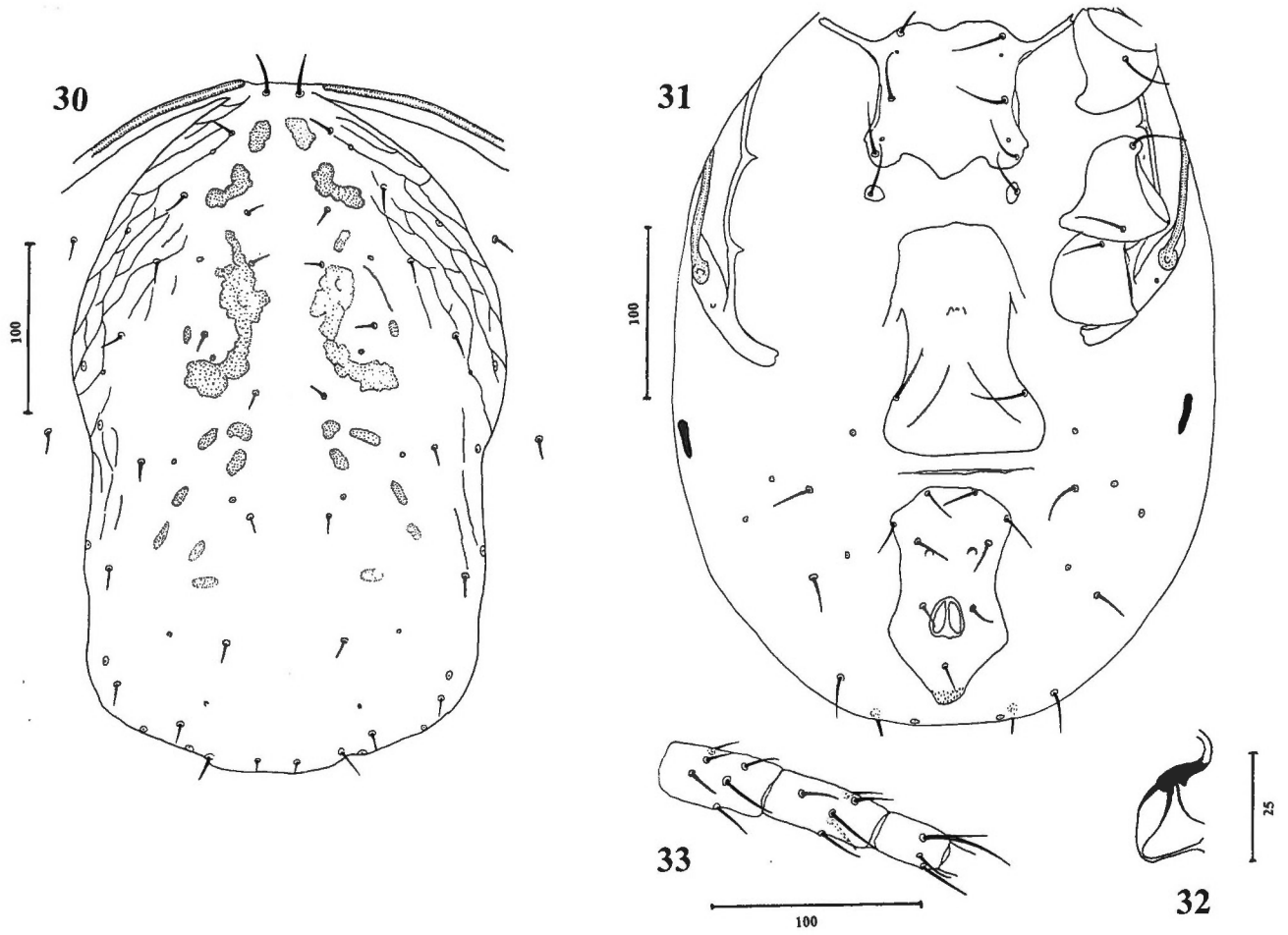
Venter (Fig. 31) — All ventral shields smooth. Distances between ST1-ST3 62 (60-63), ST2-ST2 59 (57-62), ST5-ST5 66 (63-69). A single pair of metapodal shields. Ventrianal shield with lateral margins concave; 115 (113-117) long, 68 (63-72) wide at ZV2 level and 64 (63-65) at anal level. Membrane surrounding ventrianal shield with four pairs of setae and five pairs of small platelets; JV5 31 (30-32) long.

Chelicera — Its position renders an examination of the teeth impossible. Fixed digit 36 long with 6-8 teeth, along inner margin and movable digit 32 long, with 1 strong tooth and an indication of two additional teeth.

Spermatheca (Fig. 32) — Proximal half of cervix 28 long and bulged, distal half slender; atrium elongate, almost kidney shaped.

Legs (Fig. 33) — Macrosetae on leg IV blunt or pointed; those on legs II and III pointed. Length of macrosetae as follows: Sge II 17 (16-18), Sge III 22 (22), Sge IV 24 (23-25), Sti IV 26 (25-28), St IV 39 (38-41); chaetotaxy of genu II 2— 2/0, 2/0 — 1 and of genu III 1-2/1, 2/0 — 1.

LOCALITY AND TYPE MATERIAL: Holotype female and 2 paratype females, Cilaos, on *Camelia sinensis* (L.) Kuntze (RQ 3605), 19-II-1997.



FIGS 30-33. — *Typhlodromalus quilicii*, n.sp. 30. — dorsum of the female. 31. — venter of the female. 32. — spermatheca. 33. — macrosetae on Leg IV.

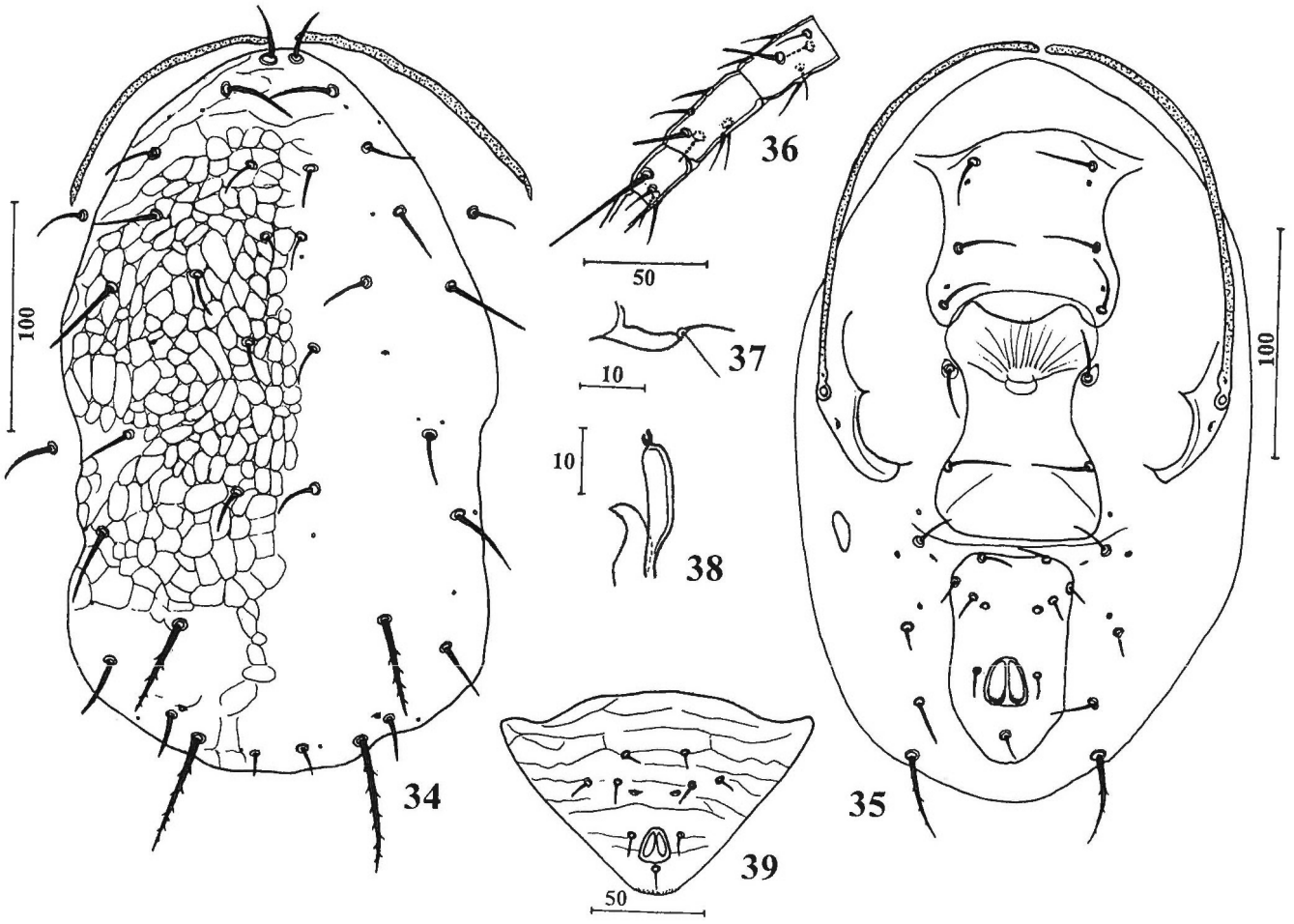
Holotype female is deposited in the Arachnida Collection of ARC-PPRI; one paratype female, in the Collection of ENSA.M-INRA and one paratype female, in the Arthropod Collection of MNHN.

DIAGNOSIS: This species closely resembles *T. rhusi* (Van der Merwe). However, it differs from *T. rhusi* by having much shorter macrosetae on leg IV (Sge 23-25, Sti 25-28 and St 38-41 as opposed to 66-68, 54-56 and 66-70, respectively, in *E. rhusi*), presence of macrosetae on genua II and III and in that j1 (25-28) is much longer than Z5 (19).

ETYMOLOGY: This species is named after Serge Quilici, stationed on La Réunion and collector of the specimens of most of the species described here.

Typhlodromips etiennei
Kreiter and Ueckermann, n.sp.
(Figs. 34-39)

FEMALE (3 specimens) Dorsum (FIG. 34) — Dorsal shield strongly reticulated, 317 (306-326) long and 206 (196-228) wide with 2 pair of glandular pores and 11 small poroids. Seventeen pairs of dorsal setae and two pairs of sub-lateral setae: j1 23 (23), j3 27 (26-27), j4 16 (14-16), j5 14 (13-16), j6 17 (16-18), J2 19(18-21), J5 9 (8-10), z2 21 (19-23), z4 25 (24-26), z5 17 (16-18), Z1 21 (21-23), Z4 39 (37-40), Z5 55 (55-56), s4 34 (34-35), S2 28 (27-29), S4 22 (21-24), S5 15 (13-16), r3 18 (18-19), R1 19 (19-24); Z4 and Z5 serrated.



FIGS 34-39. — *Typhlodromips etiennei*, n.sp. 34. — dorsum of the female. 35. — venter of the female. 36. — macrosetae on Leg IV. 37. — spermatheca. 38. — spermatodactyl. 39. — ventrianal shield of the male.

Peritreme (FIG. 34) — Reaching anterior to j1.

Venter (Fig. 35) — All ventral shields smooth. Sternal shield less wide than long, with three pairs of setae and two pair of pores. The fourth pair on a small metasternal shield. Distances between ST1-ST3 60 (58-61), ST2-ST2 56 (56) and ST5-ST5 61 (60-61). One pair of elongate metapodal shield, 17 long and 4 wide. Ventrianal shield with 3 pairs of pre-anal setae and a pair of large lateral pre-anal pores, 97 (97-98) long, 52 (50-55) wide at level of ZV2 and 55 (53-58) at anal level. Membrane surrounding ventrianal shield with 4 pairs of setae and 4 pairs of platelets.

Legs (Fig. 36) — Macrosetae on all legs acute: Sge I 16, Sge II 16 (14-16), Sge III 17 (16-18), Sti III 16, Sge IV 27 (26-29), Sti IV 20 (19-21), St IV 50 (48-52); chaetotaxy of genu III 1 — 2/0, 2/1 — 1 and of genu IV 1 — 2/0, 2/1 — 1.

Chelicera — Its position renders an examination of the teeth impossible. Fixed digit 27 long and movable digit 29 long.

Spermatheca (Fig. 37) — Cervix sausage-shaped, 16 long, wider diameter 5, atrium small.

MALE (1 specimen). Dorsum — Dorsal shield as in female, 231 long and 209 wide. Setae j1 18, j3 19, j4 13, j5 13, j6 16, J2 14, J5 8, z2 16, z4 21, z5 13, Z1 16, Z4 29, Z5 40, s4 26, S2 21, S4 18, S5 13, r3 16, R1 13.

Peritreme — Reaching to level of z4.

Chelicera (Fig. 38) — Spermatodactyl club-shaped, with two small fingers at the top, shaft 24 long.

Venter (Fig. 39) — Distances between ST1-ST5 97, ST2-ST2 52, ST5-ST5 39. Ventrianal shield with 3 pairs of pre-anal setae and a pair of large pre-anal pores, 89 long, 147 wide at anterior corners and 89 at anus level; not fused with peritrematal shields.

Legs — Macrosetae acute: Sge I 13, Sge II 13, Sge III 16, Sti III 13, Sge IV 19, Sti IV 16, St IV 37.

LOCALITY AND TYPE MATERIAL: Holotype female, Petite France, on *Zea mays* L., 16-IV-1997 (RQ 3203); two paratype females, Petite France, on *Rubus alceifolius,* 16-IV-1997 (RQ 3203); one paratype male, Dos d'Ane, on *Stenotaphrum dimidiatum* (L.) Brongn. 16-IV-1997 (RQ 3623).

Holotype female and one paratype male are deposited in ENSAM-INRA Acarologie; two paratype females, in ARC-PPRI.

DIAGNOSIS: This new species resembles *Typhlodromips reptans* (Blommers, 1974) but differs in having the dorsum reticulated, all dorsal setae longer except z5 and S5 (which are equal) and Z4 and Z5 (which are longer in *T. reptans*), StIV shorter, ventrianal shield wider in the females, different shape of spermatodactyl.

ETYMOLOGY: This species is named in honor of the French entomologist Jean Etienne, of INRA Antilles-Guyane (Petit-Bourg, Guadeloupe), who contributed to the knowledge of insect and mite faunas of La Réunion Island in the first part of his career.

Amblyseiella spinosa
(Meyer & Rodrigues), new comb.
[*Amblyseius spinosus* Meyer & Rodrigues, 1966: 224.
Kampimodromus spinosus (Meyer & Rodrigues),
QUILICI *et al.*, 2000

This species described by MEYER & RODRIGUES (1966) under the genus *Amblyseius* and assigned recently to the genera *Kampimodromus* (QUILICI *et al.*, 2000) is re-assigned in this paper to the genus *Amblyseiella*.

The presence of setae S4, the absence of setae S5, a ventrianal shield and a spermatheca different from those existing within the genus *Kampimodromus*, more than 3 and 1 teeth on the fixed and movable cheliceral digits respectively, macrosetae on all genua and more than one on leg IV and longer peritremes, reaching j1, do not fit the definition of the genus *Kampimodromus* (RAGUSA & TSOLAKIS, 1994). It however corresponds with the definition of the genus *Amblyseiella* (MUMA, 1955; MUMA & DENMARK, 1970).

Amblyseiella spinosa can be defined as follows: S5 absent; all setae stout and strongly serrated, except j4, j5, z5, r3 and R1; ventrianal shield bearing 3 pairs of pre-anal setae and one pair of pores, closely associated with JV2; two pairs of metapodal platelets; sternal shield longer than broad, the caudal margin strongly convex and deeply incised on either side; metasternal setae on small platelets; spermatheca asymetric, with large lips occupying the atrium which is small in comparison to the lopsided, swollen cervix. To the one side of this caecum, the cervix enters the vesicle as a narrow, somewhat flared tube; genua I-IV and basitarsus IV each with a macroseta.

This species resembles *Amblyseiella athiasae* Pritchard & Baker (PRITCHARD & BAKER, 1962) in lacking S5, having three pairs of pre-anal setae and one pair of pores on the ventrianal shield, dorsal setae strongly serrated, peritreme reaching j1 and macrosetae on all legs. It differs in having not all setae serrated, less teeth on chelicerae, an elongated ventrianal shield more convex anteriorly and an asymetrically spermatheca.

It differs from the two other species of the genus, *Amblyseiella setosa* Muma (MUMA, 1955) and *A. rusticana* (Athias-Henriot) (ATHIAS-HENRIOT, 1960) in having three pairs of pre-anal setae on the ventrianal shield and most of the dorsal setae serrated.

KEY TO THE PHYTOSEIIDAE OF RÉUNION ISLAND

1. – Setae z3 and s6 absent ..... AMBLYSEIINAE 2
1′. – Either or both setae z3 and s6 present 22
2. – Most dorsal setae very short, with setae j1, j3, s4, Z4 and Z5 usually the longest, some even very long and whiplike, seta Z1 absent in some species ..... ***Amblyseius*** Berlese 3
2′. – Dorsal setae almost equally long or other combinations of long setae 6
3. – Ventrianal shield vase-shaped 4

3′. – Ventrianal shield squarish. ..... *A. tamatavensis* Blommers

4. – Pre-anal pores closely associated with setae JV2... 5

4′. – Pre-anal pores not associated with JV2 ..... *A. neolargoensis* Van der Merwe

5. – Cervix of spermatheca parallel-sided ..... *A. largoensis* (Muma)

5′. – Cervix flared towards vesicle... *A. herbicolus* Chant

6. – Setae j4, j5, J2, S2, S4, S5 present..... 7

6′. – One or more of these setae absent 17

7. – Pre-anal setae arranged in transverse rows with JV1 mostly inserted well behind anterior margin of ventrianal shield; if on anterior margin, peritremes relatively short, seldomly surpassing j3, and the fixed cheliceral digit bears 2-7..... ***Euseius*** Wainstein 8

7′. – Setae JV1 on anterior margin; peritremes longer; fixed digit with 8 or more teeth..... 10

8. – Setae JV1 on anterior margin of ventrianal shield . 9

8′. – Setae JV1 well behind anterior margin; cervix of spermatheca a slender tube which widens suddenly before joining the vesicle; ventrianal shield narrow anteriorly..... *E. ovaloides* (Blommers)

9. – ll dorsal setae very short and smooth, except for j1 and Z5 which are longer; spermatheca with proximal fourth or half of cervix swollen, rest a slender tube which flares towards vesicle; peritreme reaching j1; macrosetae on leg IV clearly longer than other leg setae..... *E. rhusi* (Van der Merwe)

9′. – Dorsal setae longer, setae Z5 serrated and s4 the longest; cervix tubular but proximally broader than distally; peritremes reach to level of setae z2..... *E. hima* (Pritchard & Baker)

10. – Sternal shield weakly sclerotized and tri-lobate posteriorly; ventrianal scutum elongate, vase-shaped or concave laterally..... ***Typhlodromalus*** Muma 12

10′. – Sternal shield different; ventrianal shield approximately shield-shaped, pentagonal or quadrate 11

11. – Sternal shield as wide as long or wider than long; macrosetae mostly present on other legs in addition to leg IV .....***Typhlodromips*** DeLeon 13

11′. – Sternal shield strongly sclerotized and straight or concave posteriorly; macrosetae present only on leg IV..... ***Neoseiulus*** Hughes 14

12. – All dorsal setae short and smooth except for setae j1 and Z5, which are the longest and equal in length; spermatheca with proximal half swollen and distal half a slender tube slightly flared towards vesicle; fixed cheliceral digit with 11 and movable digit with 3 teeth; peritreme reach to setae z2..... *T. nesiotus* n.sp.

12′. – Anterior half of dorsal shield oval and posterior half rectangular, seta j1 much longer than Z5; fixed cheliceral digit with 6-8 teeth and movable digit with one tooth and an indication of 2 more; peritremes almost reach to setae j1 .....*T. quilicii* n.sp.

13. – All dorsal setae short to very short, except for setae Z4 and Z5; cervix of spermatheca long and slender but flares towards vesicle; fixed cheliceral digit with 8 teeth and movable digit with 3; anterior margin of ventrianal shield as broad as or broader than posterior margin of genital shield..... *T. reptans* (Blommers)

13′. – Dorsal setae long; cervix of spermatheca elongate and concave on one side; anterior margin of ventrianal shield narrower than posterior margin of the genital shield..... *T. etiennei* n.sp.

14. – Leg IV with 2-3 macrosetae 15

14′. – Leg IV with one macroseta 16

15. – Spermatheca with proximal third of cervix very slender, distal two-thirds a broad tube; seta R1 usually on dorsal shield; leg IV with 2 macrosetae (Sti absent) ... *N. scapilatus* (Van der Merwe)

15′. – Cervix bell-shaped; leg IV with 3 macrosetae..... *N. bayviewensis* (Schicha)

16. – Dorsal shield smooth, except for a few striae anterolaterally, dorsal setae short, most not reaching seta next behind; cervix of spermatheca cone-shape..... *N. barkeri* Hughes

16′. – Dorsal shield distinctly reticulated, dorsal setae long, most reaching seta next behind; cervix a broad tube, but proximal third strongly constricted ..... *N. teke* (Prichard & Baker)

17. – Three to 4 pairs of dorsal setae absent..... 18

17′. – Setae S2 and S4 absent, setae J2 and S5 absent or present; setae j1, j3, s4, Z4, Z5, r3 and/or R1 usually long, thick and serrated ..... ***Paraphytoseius*** Swirski & Schechter

Dorsal shield notched lateral to setae s4; ventrianal shield elongate with minute pores; cervix of spermatheca a hollow disc; leg IV with 4 distally knobbed macrosetae..... *P. multidentatus* Swirski & Schechter

18. – Seta J2 absent; seta S5 present..... 19

18′. – Seta J2 present but seta S5 absent..... ***Amblyseiella*** Muma

Dorsal shield reticulated, most dorsal setae serrated; cervix lob-sided, swollen, but narrows suddenly and the flares towards vesicle; leg IV with 2 macrosetae, both with small knobs distally..... *A. spinosa* n. comb. (Meyer & Rodrigues)

19. – Seta J2 absent but setae S2 and S4 present; setae short to very short except s4, Z4 and Z5 ..... ***Proprioseiopsis*** Muma...20

19′. – Seta J2 absent but setae S2 and S4 absent; some setae very long; ventrianal shield reduced 21

20. – Most dorsal setae very short, except for s4, Z4 and Z5 which are much longer, spermatheca with major duct of

cervix broad, constricted medially, cervix caliciform; leg IV with 3 long macrosetae ..... *P. tulearensis* (Blommers)

20′. – Most dorsal setae very short, except for s4, Z4 and Z5 which are very long, twice as long as in *P. tulearensis*; spermatheca with major duct of cervix inflated, cervix caliciform; All legs with long macrosetae, especially leg IV; anterior margin of the ventrianal shield less wide than the posterior margin of the genital shield ..... *P. longipilus* n.sp.

21. – Setae J2, S2 and S4 absent; ventrianal shield reduced ..... ***Phytoseiulus*** Evans

Setae j3, j4, j5, j6, s4, Z1, Z4 and Z5 long to very long and serrated; ventrianal shield without pre-anal pores; spermatheca with cervix swollen proximally, constricted medially and flared distally; leg IV with 3 macrosetae, some leg setae serrated..... *P. persimilis* Athias-Henriot

21′. – Setae j5, J2, S2 and S4 absent; ventrianal shield large with 3-5 pairs of pre-anal setae, seta ZV3 may be absent..... ***Phytoscutus*** Muma

Setae j3, s4, Z4 and Z5 long to very long, rest very short, except for z2; genital and ventrianal shields reticulated, latter large and squarish bearing 3 pairs of pre-anal setae; cervix funnel-shaped; leg IV with 3 long macrosetae; primary metapodal shield ring-like, secondary shield very small..... *P. reunionensis* (Ueckermann & Loots)

22. – At least one of these setae present ..... TYPHLODROMINAE Chant & McMurtry 27

22′. – Setae z3 and s6 present ... ***Phytoseius*** Ribaga 24

23 – Setae z3 absent and s6 present .. ***Platyseiella*** Muma

Setae j3, s4, s6, Z4, Z5 and r3 long to very long and serrated, rest very short; ventrianal shield without pores; cervix of spermatheca a long slender tube that flares towards vesicle; leg IV with 4 knobbed macrosetae ..... *P. longicervicalis* (Moraes & McMurtry)

23′ – Seta R1 present; setae j1, j3, z3, Z4, Z5, s4, s6 and r3 long to very long and serrated, rest very short and smooth; spermatheca with major duct broad, cervix slender proximally but strongly flared distally, with notocephalic pore near setae z5; leg IV with 4 macrosetae, Sge, Sti and St irregularly expanded and knobbed distally, one on tarsus only knobbed ..... *P. amba* Pritchard & Baker

24. – Seta R1 absent; setae j1, j3, z3, Z4, Z5, s4, s6 and r3 long to very long and serrated, rest very short and smooth, notocephalic pore absent, setae s4 and Z4 divided and flattened or not; leg IV with or without macrosetae 25

24′ – Macrosetae present on leg IV..... 26

25. – .Macrosetae absent on leg IV ..... *P. intermedius* Evans & Mcfarlane

25′. – Setae s4, Z4 and Z5 not bifurcated and flat but broad and serrate; cervix of spermatheca with proximal half slender and distal half bell-shaped... *P. haroldi* n.sp.

26. – Setae s4, Z4 and Z5 flat, broad and bifurcated; cervix bell-shaped..... *P. crinitus* Swirski & Schechter

26′ – Setae z6 present ..... ***Kuzinellus*** Wainstein 28

27. – Setae z6 absent; setae S4, S5 and JV4 present ..... ***Typhlodromus*** Scheuten 29

Z4 and Z5 serrated, the latter knobbed distally; cervix of spermatheca a long and slender tube that widens suddenly distally; leg IV with one knobbed macroseta.... *K. scytinus* (Chazeau)

27′. – Dorsal shield reticulated with all setae long, serrated and knobbed distally, except for S5 and J5, which are very short, smooth and acute; ventrianal shield with 3 pairs of pre-anal setae and no pores; cervix proximally slender but flares gradually distally; leg IV with 3 knobbed macrosetae..... *T. transvaalensis* (Nesbitt)

28. Z5 serrated; S4, S5 and Z5 knobbed; cervix of spermatheca a long tube inflated in an elongate pocket in the center; leg IV with three knobbed macrosetae ..... *K. bourbonensis* n.sp.

29. – Dorsal shield reticulated with all setae short, j1, s4, Z1, Z4, Z5, S2, S4, S5, r3 and R1 serrated; ventrianal shield with 4 pairs of pre-anal setae and one pair of pores; cervix caliciform; leg IV with 1 knobbed macroseta ..... *T. moraesi* n.sp.

ACKNOWLEDGEMENTS

We are very grateful to Marie-Stéphane TIXIER (ENSA.M-INRA Acarologie) for valuable suggestions concerning the genus *Amblyseiella* and comments on an early version of this manuscript. Thanks are also due to Gilberto J. DE MORAES (ESALQ, Piracicaba, Brasil) and Philippe AUGER (ENSA.M-INRA Acarologie) for valuable comments on an early version of this manuscript and to Serge GLENAC (CIRAD — FLHOR Réunion) for his great help in collecting most of the specimens.

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